Brains Behind Bars

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Summary

Research on the relationship between neurobiological factors, such as brain functioning and heart rate, and antisocial behavior has grown exponentially in recent decades. As a result, we now know that individuals with antisocial behavior problems are often associated with, for example, low resting heart rate and reduced stress hormone levels. Overall, the neuroscientific perspective has become an important additional approach for the study of antisocial behavior.

Despite increased knowledge within the field of neurobiology and criminal behavior, neuroscientific insights do not play a significant role in the treatment of criminal behavior. From a historical point of view, psychosocial perspectives dominate the way we think about how to tackle crime-related problems. As a result, cognitive behavioral therapy (CBT) plays an important role in the correctional setting and is recognized as one of the most accepted treatment forms for antisocial behavior. CBT programs draw from psychological perspectives to ameliorate cognitive skills, including impulse control and problems solving skills. However, despite the fact that CBT is recognized as one of the most effective correctional treatment options, not all offenders respond well to it.

The aim of the current dissertation is to examine whether neuroscientific knowledge could provide more insight into the question of why CBT is not effective for all offenders. First, the predictive value of neurobiological factors in relation to the treatment outcome of prisoners is investigated. Examining this relationship might provide more insight into who is able to benefit from therapy and who is not, from a neurobiological perspective. Second, we examined whether neurobiological factors change in response to CBT. Investigating this issue could reveal more information about *why* current treatment options may be effective in reducing antisocial behavior.

In order to examine both research goals, two literature studies were conducted. In addition, male adult prisoners were asked to participate in the research. These prisoners were selected by Probation Service officers to take part in a cognitive skills training program called 'Cognitieve Vaardigheden' (CoVa). In total, 190 prisoners participated, of which 121 started the CoVa training program and 69 prisoners served as a waitlist control group. Two assessments were conducted: directly after inclusion in the study and ten weeks later, when prisoners in the intervention group completed the training program. During these assessments, various neurobiological measures, including neurocognitive tasks and a heart rate assessment, and questionnaires were completed by prisoners. In addition, mentors and trainers were asked to evaluate prisoners' behavior twice.

Prisoners themselves also evaluated their own behavior. Finally, treatment dropout is also considered as a treatment outcome measure. In the following sections, the main results are described.

The literature review described in chapter 2 revealed that research on the predictive value of neurobiological factors in relation to treatment outcome of individuals with antisocial behavior is scarce. Of the ten studies that were found, a majority included child and adolescent samples. The most important and consistent finding is that indices of low physiological arousal (especially low cortisol levels) are related to poor treatment outcome. This suggests that individuals with antisocial behavior characterized by low physiological arousal before treatment may benefit less from intervention compared to individuals with higher physiological arousal.

Chapter 3 shows the results of our empirical study on the predictive value of neurobiological factors in relation to prisoners' treatment outcome. In total, 121 adult prisoners who were selected for the cognitive skills training program by Probation Service officers, participated in the study. Overall, most of the neurobiological factors that were measured in this study were not found to be predictive of treatment outcome. Nevertheless, there is evidence that prisoners who performed worse on a concentration/attention task were less likely to complete treatment. Although the predictive power of this simple test was modest, it was found to be superior to, for instance, a 'conscious' self-report assessment of treatment motivation as administered by the prisoners.

The second literature review, described in chapter 4, revealed 11 relevant studies that examined neurobiological changes after behavioral intervention for individuals with antisocial behavior. In general, the values of specific neurobiological risk factors, particularly of basal cortisol, changed following behavioral intervention. Furthermore, the results of the literature review show that there seems to be a relationship between neurobiological 'normalization' and behavioral changes in response to intervention.

Chapter 5 presents the results of our empirical study on neurobiological changes after intervention. To examine these neurobiological changes, both groups (intervention and waitlist control group) were included. In general, no significant changes in neurocognitive functioning and heart rate activity were detected in favor of prisoners who completed the intervention. Furthermore, only small behavioral changes were detected among prisoners who completed the intervention compared to the waitlist control group.

Finally, in chapter 6, we argue that with the ongoing increase in knowledge on neurobiological characteristics related to criminal behavior, it is worthwhile exploring how neurobiological measurements could play a more significant role in the field of criminology. The results of this dissertation show that neurobiological measurements do not necessarily require complex and expensive equipment. Instead, relatively 'simple' methods, such as the attention/concentration task, could have an added value for criminological research purposes.

The results of this dissertation show that there is evidence for a relationship between neurobiological factors and prisoners' treatment outcome. With this research we have demonstrated the added value of a neuroscientific approach in order to gain more insight into the working mechanisms of correctional intervention programs. At the same time, this dissertation indicates that research within the field of correctional rehabilitation and neurobiology is new and explorative. Nevertheless, several provisional suggestions can be made for practical implications.

First, the attention/concentration task could be added to the current treatment selection procedure for early detection of individuals who are at risk of dropping out of treatment. This knowledge might then be used to provide these individuals extra guidance throughout the training program to reduce dropout rates. However, improving the treatment selection procedure might not be sufficient. The results of this dissertation suggest that the current treatment program itself has limited efficacy and therefore might not result in significant behavioral improvement. For this reason, it would be useful to take a closer look at the current content of these intervention programs. Neuroscientific insights could be used to improve the content of cognitive behavioral intervention programs. For example, from neuroscientific literature it is known that individuals with antisocial behavior are often characterized by working memory deficits. Adding a supplementary module which focuses on working memory skills could potentially reduce criminal behavior in a more efficient way. Finally, in addition to improving current intervention programs, we should also invest in the development of alternative, partly neuroscientific oriented, intervention options. Examples of potential alternative intervention methods are 'serious gaming', food supplements, and brain stimulation techniques. These methods are currently under research, but might become concrete intervention options in the long run to actually tackle criminal behavior.